

**Appendix 3:
Correspondence and Questionnaires
Used in Contingent Valuation Survey**

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**Mail/In-Person Follow-Up Survey:
Contents of Packet Received in Mail**

a. Letter of Introduction

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Table A2.2 Comparison of Model Specifications for Three Best Solutions

	Model 1	Model 2	Model 3
Total number of households selected (N)	750	750	750
Minimum number of households selected around each interview site (S_1, S_2, S_3)	200	200	200
Maximum number of households selected around each interview site (B_1, B_2, B_3)	300	300	300
Minimum number of census tracts selected around each interview site (m_1, m_2, m_3)	12	13	12
Absolute upper bound of number of households selected from each census tract (U)	60	60	50
Absolute lower bound of number of households selected from each census tract (L)	3	3	3
Proportional upper bound of number of households selected from each census tract (u)	5%	10%	10%
Proportional lower bound of number of households selected from each census tract (l)	0.5%	0.5%	0.5%
Objective value d (which is comparable to the statistic Z value)	0.2496	0.245	0.266

2.5 Discussion

This model solves a problem of sampling from nonrandomly selected clusters, where the number of clusters is small and there are multiple statistical indicators. Even though this problem exists in many survey studies, it has not been solved formally and successfully. Our model provides a general tool for solving this type of sampling problem: it is both theoretically tractable and practically manageable.

The model uses the normalized deviations between selected important socioeconomic indicators for the proposed sample and the whole study population as the measure of the representativeness of the sample. It not only provides a way to put all indicators in a comparable context, but also

makes it possible to measure this representativeness statistically.

These normalized deviations are actually the Z statistics calculated for each of the socioeconomic indicators. The objective of this mathematical programming problem, minimizing the maximum normalized deviation, tends to equalize the normalized deviations of all the indicators, and hence the d value, even though the constraints were only defined so that the deviations could not be greater than the d value. In cases where indicators are not equally important, a weighting procedure could easily be incorporated into the normalized deviations for the objective function. We would expect that all weighted deviations would have equal values in the final model solution as well.

The model's tendency to equate the values of the deviations (which then becomes the d value), leaves us with a general measure of the representativeness of a proposed sample given multiple indicators. Furthermore, because this d value is assumed to have a standard normal distribution, we obtain a quantitative measure of the statistical confidence that we can have of the representativeness of a sample with multiple indicators. For example, the d value for our preferred solution is .25, indicating that our solution is within .24 standard deviations of the true mean of all indicators used to represent the five-county study population. The probability that the expected means arising from our model solution is still significantly different from the indicator means for the study population can be obtained from a standard Z statistic table. For our case the Z statistic is 0.1896. Thus, we can say that we have a confidence level of 81 percent (i.e., $(1-.1896)*100$) that the expected mean values of the indicators for a randomly selected sample of the number of households from each census tract given by the model solution will not be significantly different (statistically) from the true population indicator means.⁴⁰

This mathematical programming approach to sample selection provides survey researchers with a powerful tool for obtaining a statistically valid sample in nonrandom cluster sampling situations. Basically, the way the model achieves a valid sample is by assigning different proportions of households to selected census tracts to minimize the model objective. Researchers can use readily available computer software to easily obtain a sampling solution.

In a general sense, the sampling procedure described in this paper may not be able to provide a sample as ideal as a simple random sampling procedure in situations where SRS is feasible. The major weakness of this model is that only the mean values of indicators were considered in the model, without any accommodation for the distribution of values around these means. More precisely, the assertion that a sample represents the study population means that the indicators should have not just the same mean values, but also the same distribution, over the sample and the study population.

⁴⁰ Usually, statistical tests reject equivalence (e.g., $b=0$) at a 5 or 10 percent confidence level, where the smaller the confidence level, the higher the confidence. Here, we are doing the opposite, rejecting that there is a difference between two statistics, so the higher the confidence level, the better. While this is a different twist on standard statistical interpretation, it uses the same principles to assess equivalence or difference from a given value.



THE UNIVERSITY OF NORTH CAROLINA
AT
CHAPEL HILL

May 7, 1993

1~ 2~ 3~ 4~
5~
6~ 7~

Dear 1~ 3~,

Your household is one of a small number of households in the Greater Houston-Galveston area that has been selected at random to take part in a survey concerning the future of Galveston Bay. This work is being conducted by The University of North Carolina, in conjunction with the Galveston Bay National Estuary Program in Webster, Texas, the Texas Water Commission, and the United States Environmental Protection Agency. **As an expression of our appreciation, we will give you \$50 for participating in this survey.**

The purpose of our research is to collect information on the economic, social and environmental importance of Galveston Bay. This information will be used by citizens and policy makers in your area to develop a comprehensive management plan for the Bay. In order for our results to accurately reflect the opinions of the people in the Houston-Galveston area, it is important that each survey be completed and returned. **Even if you have no direct use of Galveston Bay, or if you have no opinion regarding some of the issues discussed in the attached materials, we still need your participation.**

We would like you to watch the enclosed, 13-minute video and then to complete the attached questionnaire. If you do not have a VCR, perhaps you could arrange to watch it at a relative's or friend's house. If it is not possible for you to watch the video, we still want you to complete and return the questionnaire.

In completing the questionnaire, if there is a question which you do not understand or do not wish to answer, please skip over it. There are no right or wrong answers; we simply want your honest opinions. Completing the attached questionnaire will take about 20 minutes.

After you have completed the questionnaire, we would like you to return it to us at *Mall of the Mainland* during one of the times listed below. At this time, we will ask you some additional questions; specifically, we would like to know your reactions to the information provided in *Section 3* of the questionnaire. This interview will take about 30-40 minutes, after which we will give you the \$50 to thank you for your participation.

To get to the *Mall of the Mainland*, take I-45 to exit #15 (Mall of the Mainland exit) and go about one quarter mile east of the interstate. We will be located in the mall's Community Room, which is shown on the attached map of the mall. You can come at any of the following times:

Saturday, May 15th	10:00 am - 8:00 pm
Sunday, May 16th	12:00 noon - 6:00 pm
Monday, May 17th	3:00 pm - 8:00 pm
Tuesday, May 18th	3:00 pm - 8:00 pm
Wednesday, May 19th	3:00 pm - 8:00 pm
Thursday, May 20th	3:00 pm - 8:00 pm
Friday, May 21st	3:00 pm - 8:00 pm
Saturday, May 22nd	10:00 am - 8:00 pm
Sunday, May 23rd	12:00 noon - 6:00 pm

Your responses to the questions in the questionnaire and during the follow-up interview will be completely confidential. Your name will never be recorded anywhere on the questionnaire. Participation in the study is voluntary and there is no penalty for not participating or for withdrawing from the study.

I would be happy to answer any questions you may have about the questionnaire or this research project. If you have any questions, or if you are not available during any of the interview times listed above, please call me collect at 919-966-7912. If I am not in, you can leave a message with my administrative assistant, Stephanie Marfino, and I will return your call. If you would like a summary of the results of this study, fill out your name and address on the enclosed postcard and return it to us. Please do not put your name or address on the questionnaire itself.

Thank you in advance for your cooperation. We look forward to seeing you at the Mall of the Mainland between May 15th and May 23rd.

Sincerely,

Dale Whittington
Professor and Co-principal Investigator

P.S. You are welcome to keep the enclosed video or pass it along to a friend, relative, library, or school group; however, if you feel you have no use for it, we would appreciate your returning it to us at the mall for re-use.

**Mail/In-Person Follow-Up Survey:
Contents of Packet Received in Mail**

b. Written Questionnaire

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GALVESTON BAY STUDY

(Please note: This questionnaire may be completed by **any adult member** of your household.)

To the respondent: Please read and complete the entire questionnaire. You should answer each question based on your *own* experience and opinion, unless you are specifically asked for *household* information. If possible, please make sure to watch the video before answering these questions.

This questionnaire has three sections. The first section asks your opinions about social, economic and environmental issues, and the second asks about your use of Galveston Bay. The third section provides important background information for the follow-up interview.

SECTION 1: SOCIAL, ECONOMIC, AND ENVIRONMENTAL ISSUES

1. In your opinion, which **two** of the problems in the box below are the most important for state and local governments of Texas to solve in the Greater Houston-Galveston area? Please write a "1" next to the **most important**, and a "2" next to the **second most important**.

a.	<input type="checkbox"/>	Unemployment
b.	<input type="checkbox"/>	Poor economy
c.	<input type="checkbox"/>	The AIDS epidemic
d.	<input type="checkbox"/>	Crime
e.	<input type="checkbox"/>	The quality of the public schools
f.	<input type="checkbox"/>	Pollution
g.	<input type="checkbox"/>	Traffic congestion in and around cities
h.	<input type="checkbox"/>	Other (please specify) _____
i.	<input type="checkbox"/>	Not sure/No opinion

2. Suppose your local government were given federal money to help solve some environmental problems in Galveston Bay over the next couple of years. Which of the problems in the box below would you hope the government worked on first and second? Please write a "1" next to the **first** problem which you hope they would solve, and a "2" next to the **second**.

a.	<input type="checkbox"/> Runoff from agricultural pesticides and fertilizers
b.	<input type="checkbox"/> Discharge of wastewater from cities around the Bay
c.	<input type="checkbox"/> Discharge of refinery and other industrial waste into the
d.	Bay
e.	<input type="checkbox"/> Seepage from landfills
f.	<input type="checkbox"/> Storm water runoff from roads and highways around the
g.	Bay
h.	<input type="checkbox"/> Oil and chemical spills from shipping in the Bay
	<input type="checkbox"/> Beach litter and other debris on the shoreline
	<input type="checkbox"/> Other (please specify) _____
i.	<input type="checkbox"/> Not sure/No opinion

3. In your opinion, has the overall environmental condition of Galveston Bay been getting better, getting worse, or staying the same in the last five years? (*Please circle one*)

- (1) Getting better
- (2) Getting worse
- (3) Staying the same
- (4) I don't know.

4. About how often have you seen, heard, or read about pollution in Galveston Bay from TV, radio, newspapers, or magazines in the last year? (*Please circle one*)

- (1) Never
- (2) A few times (1 to 4)
- (3) Several times (5 to 10)
- (4) Many times (11 to 20)
- (5) More than 20 times
- (6) I don't know.

5. Do you feel that reducing water pollution in Galveston Bay is important?

(1) **No.** I don't feel that reducing water pollution in the Bay is important.

If no, please circle the letter below that most closely reflects your thinking.

- (a) I don't think that pollution of the Bay is a problem.
- (b) I think that there are other problems that should be addressed first.
(please specify): _____
- (c) For other reasons (please specify): _____
- (d) I don't know.

(2) **Yes.** I do feel that reducing water pollution in Galveston Bay is important.

If yes, please circle the letter below that most closely reflects your thinking.

- (a) I want to use the Bay for recreation purposes.
- (b) I want others to be able to use the Bay for recreation purposes.
- (c) I want to prevent further harm to mammals, birds, fish and other wildlife.
- (d) I want to protect human health.
- (e) I want to protect the entire Bay environment for future generations.
- (f) For other reasons (please specify): _____
- (g) I don't know.

6. There is currently a proposal to deepen and widen the Houston Ship Channel including the part of it that runs through Galveston Bay. Which of the following statements best reflects your knowledge of this issue? (Please circle one)

- (1) I am not aware of this proposal.
- (2) I have heard about it but don't know the details of the proposal.
- (3) I know a good deal about it.

7. Which of the following statements most closely reflects your opinion? (Please circle one)

- (1) Creating and protecting jobs is more important than preserving the environment.
- (2) Protection of the environment should not be sacrificed to save jobs.
- (3) I am not sure.
- (4) I don't have an opinion on this subject.

SECTION 2: YOUR USE OF GALVESTON BAY

Please note: "Galveston Bay" refers to the Bay system that includes Trinity, East, West, and Christmas Bays, as well as the many minor bays and bayous that feed into it, including Clear Lake. These questions do NOT include the Gulf of Mexico or other nearby water bodies (i.e., these questions do not concern the ocean side beaches on Galveston Island, or freshwater lakes).

8. How far is it from your home to the closest part of the Bay? *(Please circle and fill in the blank where appropriate)*

- (1) _____ miles
(2) _____ driving time
(3) I live next to the Bay

Please note: In questions 9 through 14, a day refers to a full day or any part of a day that you spent doing the activity.

9. In the last 12 months, did you **go to a beach** on Galveston Bay? *(Please circle one)*

- (1) Yes (2) No (3) I don't remember

If yes, about how many days did you go to a Galveston Bay beach in the last 12 months?

10. In the last 12 months, did you go **hiking, picnicking, camping, and/or birdwatching** along the shore of Galveston Bay? *(Please circle one)*

- (1) Yes (2) No (3) I don't remember

If yes, about how many days did you go hiking, picnicking, camping, and/or birdwatching in the Bay in the last 12 months? _____

11. In the last 12 months did you go **hunting or trapping** on or along the Galveston Bay shore? *(Please circle one)*

- (1) Yes (2) No (3) I don't remember

If yes, about how many days did you go hunting or trapping on or along the Galveston Bay shore in the last 12 months? _____

12. In the last 12 months, to your knowledge did you **eat seafood** which was caught in Galveston Bay? *(Please circle one)*

- (1) Yes (2) No (3) I don't remember

If yes, about how many times **per month** do you eat seafood from Galveston Bay? ____

13. In the last 12 months, did you use Galveston Bay for recreational **fishing**, either from a boat, a pier, a jetty, or along the shore? *(Please circle one)*

(1) Yes (2) No (3) I don't remember

If yes, about how many days did you use Galveston Bay for recreational fishing in the last 12 months? ____

14. In the last 12 months, have you used Galveston Bay for recreational **boating**? This includes canoeing, kayaking, motorboating, sailing, windsurfing, jetskiing and waterskiing.

(1) Yes (2) No (3) I don't remember

If yes, about how many days did you use Galveston Bay for recreational boating in the last 12 months? ____

SECTION 3: GALVESTON BAY

In the following section, we describe current issues for the future of Galveston Bay. Please read the description carefully and think about the ways in which the Bay is valuable to you.

OVERVIEW: GALVESTON BAY TODAY

Galveston Bay is made up of many smaller bays and bayous, including Trinity Bay, West Bay, East Bay, and Clear Lake. Fresh water from rivers and streams flows into the Bay and combines with salt water from the Gulf of Mexico to form an area in which many fish, shellfish, and coastal birds live and breed. Some features that make the Bay such a productive area for fishing and shellfishing are its wetlands, areas of underwater grasses, and oyster reefs. Galveston Bay produces more oysters than any other estuary on the Texas coast; in good years, the Bay yields as much as 70% of the oyster production in Texas and 30% of all oysters harvested in the United States.

Galveston Bay is also home to the Port of Houston, the third largest port in the country. The Houston Ship Channel, which passes through the Bay between Houston and Galveston, is an important transportation link between Texas and the rest of the world. Nearly one third of the nation's petroleum production and half of its chemical production are transported through this channel. The port and ship channel contribute to employment and income of the region.

The Bay also provides recreational and educational opportunities for many people. Fishing, boating, swimming, camping, birdwatching, hunting, and hiking along the shoreline are

ways in which many people enjoy using the Bay. Wildlife preserves, such as those at Armand Bayou and Christmas Bay, are important educational areas for school children and researchers alike.

HOW IS GALVESTON BAY CHANGING?

Over the past 50 years, the Bay has undergone many changes. Industrial development has created jobs in the region, which has stimulated population growth and increased the need for new housing and recreational opportunities. The population of the greater Houston-Galveston area is now approximately 3.3 million, and it is expected to grow to 4 million by the year 2000. This growth will put additional demands on the resources of the Bay.

The economic growth and population increases have affected the Bay in a variety of ways. In the mid-1960s the water quality in the Bay was extremely poor, mostly due to inadequate treatment of wastewater from cities and industries. In the 1970s, laws were passed to improve water quality. These have helped reduce the amounts of some pollutants, so now the Bay is much cleaner than it has been for a long time. However, half of the Bay is still closed to shellfishing due to public health concerns, and the number of oil and chemical spills in the Bay has increased.

Economic and population growth in the Bay area have also had effects on wildlife habitat and natural areas, such as the loss of coastal wetlands. Pumping of groundwater, oil, and gas around the Bay leads to land subsidence (sinking), which destroys wetlands. In addition, development near the shore (of roads, houses, factories, etc.) often results in the loss of wetlands. Lastly, waves from ships passing through the Bay beat steadily on the edges of wetland areas, breaking them down. An example of what can happen because of these pressures is the situation on Galveston Island, where 37% of the wetlands have been lost. Seagrass areas in the Bay, which are important for fish spawning, have also been damaged. Waves from ships and motorized boats stir up sand and mud, clouding the water and blocking out sunlight needed by seagrasses. Ninety five percent of the Bay's seagrass areas have been destroyed since 1979.

MANAGING THE MANY USES OF THE BAY

Finding a balance between the protection of public health, the preservation of natural areas for future generations, and the industrial, shipping, and recreational uses of the Bay requires thought and planning. The adoption of a management plan for Galveston Bay may help address these conflicting uses.

Likely situation if no management plan is implemented:

If no management plan for Galveston Bay is implemented, it is likely that more wetland areas and other habitats will be lost. If current trends continue, 10% of the remaining wetlands in the Bay (about 30 square miles) will be lost in the next 20 years, and about half of the wetlands will be lost by the year 2100. Without a management plan, the water quality of

Galveston Bay would probably not change much. Currently, half of the Bay is open for shellfishing and it is likely that this will continue if no management plan is adopted. It would probably remain safe to eat the currently suggested limit of about four ounces (one serving) of shellfish per person from the Bay every week. The number of oil and chemical spills requiring Coast Guard assistance is now about 1 every day, and is likely to remain at this level if a management plan is not implemented.

Description of a Possible Management Plan for Galveston Bay

Suppose a management plan were proposed for Galveston Bay that tried to balance the needs of current users of the Bay, such as commercial fishermen, industries, and citizens, with the goals of improved water quality and wildlife habitat protection.

Assume the management plan included the following regulatory actions which would:

- tighten water quality standards for municipal and industrial wastewater discharges, and prohibit discharges of wastewater from oil wells into the Bay;
- restrict further residential and commercial development in environmentally sensitive areas;
- increase monitoring and enforcement activities, including efforts to prevent illegal dumping into storm sewers;
- prohibit dumping of sewage from recreational and commercial boats into the Bay; and
- require those responsible for oil and chemical spills in Galveston Bay to pay for the damages these spills cause.

In addition, suppose that the management plan included several **new programs** to improve environmental quality in the Bay. These efforts would:

- initiate a cleanup program to remove trash and marine debris along the Galveston Bay shoreline;
- create new "wetland reserves" in existing wetland areas and replant damaged seagrass beds to provide habitat and breeding areas for many species of birds and fish;
- purchase more equipment to control and clean up oil and chemical spills in Galveston Bay and establish a "rapid response" capability to minimize the effects of these spills;

- establish a program to test all types of seafood regularly and to warn the public of possible contamination of seafood from the Bay; and
- establish recycling and public education programs to reduce discharges of waste oil, fertilizer, pesticides, and other hazardous substances from households and businesses that now find their way into Galveston Bay.

This management plan would not affect the amount of shipping activity through Galveston Bay. Assume that shipping would be allowed to grow, whether or not the Houston Ship Channel is deepened and widened, as long as environmental standards on oil and waste discharges were strictly observed. In other words, this management plan would not restrict commercial shipping activity through the Houston Ship Channel, nor would it prevent the deepening and widening of the channel.

The citizens of the greater Houston-Galveston area would obviously like to know **how much** the quality of the Bay would improve as a result of this management plan, as well as what impacts it might have on the region's economy. The economy and ecosystem of Galveston Bay are too complex, however, to predict precisely the effects that such a plan would have.

If the management plan were adopted, we know that water quality in the Bay would be improved. The Bay would also be **safer** because less toxic material (such as heavy metals and pesticides) would be discharged into its waters. Experts also estimate that 50% more oyster beds could be opened for harvest, and it would probably be safe to eat more shellfish than the currently suggested limit of about four ounces per week. In addition, the management plan would reduce the number of spills in the Bay.

If this plan were adopted, it would cost money. Assume that industries would pay the cost of reducing pollution that comes from their facilities, and that citizens in the Galveston Bay area would also be asked to help finance this plan. Also remember that improvements in the quality of the Bay would not occur overnight, but would require a long-term commitment of financial and other resources.

Considering your current income, as well as your expenses for housing, food, utilities, clothing, entertainment, savings, etc., please think about how much you would be willing to pay per month to establish such a management plan for Galveston Bay.

When you come to the *Mall of the Mainland*, we would like to ask you some questions about whether or not you would support such a plan for the Bay.

Please use the space below for any comments you feel may be helpful to us in our research.

Your contribution to this effort is greatly appreciated. We look forward to seeing you at the Mall of the Mainland on:

Saturday, May 15th	10:00 am - 8:00 pm
Sunday, May 16th	12:00 noon - 6:00 pm
Monday, May 17th	3:00 pm - 8:00 pm
Tuesday, May 18th	3:00 pm - 8:00 pm
Wednesday, May 19th	3:00 pm - 8:00 pm
Thursday, May 20th	3:00 pm - 8:00 pm
Friday, May 21st	3:00 pm - 8:00 pm
Saturday, May 22nd	10:00 am - 8:00 pm
Sunday, May 23rd	12:00 noon - 6:00 pm

Thank you again!

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Mail/In-person Follow-up Survey:
Follow-up Questionnaire
Part I.
(Read Aloud by Enumerator)

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Enumerator's Name: _____
Date: _____
Questionnaire Version: _____
Location: NW/MM/BT

Follow-up Questionnaire

(Speak slowly, project your voice)

Hello, my name is [____], and I am a (professor/graduate student) at the University of North Carolina at Chapel Hill. Thank you very much for returning the questionnaire that we sent you.

I'd like to follow up with you now on some of the issues raised in the questionnaire. There will be two parts to this interview. In the first part, I will ask you some questions and I will write down the answers. The second part is a short written questionnaire that I will ask you to fill out yourself. If there are any questions that you do not want to answer, just tell me and we can skip them. Also, I want to emphasize that there are no right or wrong answers. We really want you to tell us your honest feelings and ideas about the issues we discuss.

In a minute I'll be asking you some questions about your willingness to pay to support the management plan described in the questionnaire you received in the mail. When you answer these questions, please remember that you, like everybody else, have many other things to spend your money on besides cleaning up and conserving the environment of Galveston Bay, and that there are recreational opportunities available to you in other places. Please take a minute and review the components of the management plan described in the questionnaire. [Enumerator: Give Handout #1 to the respondent and give them time to look it over] Do you have any questions about the management plan?

Since everyone in the five county area surrounding the Bay would have to bear part of the cost of implementing such a management plan, we are using this survey to ask people how they would vote if they had the chance to vote on the management plan.

We have found that some people would vote for the management plan because they feel that it is worth the money it would cost them to improve the environmental quality of Galveston Bay. Others that would vote against the management plan usually mention one of the following reasons. The first is that they are concerned that it would reduce economic growth in the region. Another is that they feel there is not enough information available about how to clean up Galveston Bay. Others think that the money they would have to pay for the management plan is more than they can afford.

[Pause]

1. Do you pay a monthly water bill?

- (1) Yes
- (2) No

[If yes,] I'd like for you to assume that you would pay for the management plan through a surcharge on your water bill. In addition, assume that this surcharge would last for five years.

[If no,] I'd like for you to assume that you would pay for the management plan over a five year period through a surcharge on another monthly utility bill.

Suppose that government officials estimated that the management plan would cost your household **\$15 per month** for five years, (i.e., a total of **\$180** per year for five years) . This money would only be used to pay for implementing the Galveston Bay management plan, and would be administered by state and local government agencies. Assume that industries would pay the cost of cleaning up the pollution that comes from their facilities.

2. Given your current income and expenses, if implementing the management plan cost your household **\$15** per month for five years, would you vote for the management plan or against it?

- (1) Vote FOR the management plan ☐ *[Go to question 3]*
- (2) Vote AGAINST the mgmt. plan ☐ *[Go to question 4]*
- (3) Not sure ☐ *[Go to question 4]*

[Record any comments the respondent makes:]

3. What if engineering studies showed that the management plan would cost more than initially expected, and the final cost estimates indicated that implementing the management plan would cost your household **\$30 per month**. Would you vote for or against the plan?

- (1) Vote FOR the management plan ☐ *[Go to question 5b]*
- (2) Vote AGAINST the management plan ☐ *[Go to question 5b]*
- (3) Not sure ☐ *[Go to question 5b]*

4. What if the engineering studies showed that the management plan would cost less than initially expected, and the final cost estimates indicated that implementing the management plan would cost your household **\$10 per month** for five years? Would you vote for or against the management plan?

- (1) Vote FOR the management plan *[Go to question 5b]*
- (2) Vote AGAINST the management plan
- (3) Not sure

- 5a. *If the respondent answers both questions 2 and 4 with No/No, ask:*
What is the maximum that you would be willing to pay per month over a five year period to support the management plan? _____ \$ per month for five years. *[If zero, go to question 6]*

- 5b. Enumerator, indicate the respondent's maximum willingness to pay here ____

*[If a zero amount, go to question 6]
[If a positive amount, go to question 7]*

6. Why did you vote against the management plan? *(Do NOT prompt)*

- (1) I cannot afford it.
- (2) I don't care much about improved environmental quality.
- (3) It is the government's responsibility.
- (4) It is industry's responsibility.
- (5) I already pay enough taxes.
- (6) I am satisfied with the existing situation.
- (7) The management plan does not specify outcomes.
- (8) Other (please specify) _____

[Go to question 9]

7. Could you explain the reasons why you are willing to pay [*WTP amount*] to have the management plan implemented? What kinds of benefits are you thinking about? *[Do NOT prompt]*

8. *[Enumerator, read options (1) and (2) before allowing response]* Could you tell me about what percent of your *[max WTP]* is just for:

(1) yourself and other members of your household to use and enjoy the Bay _____

and about what percent is just for:

(2) other households in the Galveston Bay area, as well as future generations, to use and enjoy the Bay _____ ?

[Enumerator, do not prompt for Other, use only if volunteered, or if respondent's total is <100%. If required, ask:]

Your response totals to ____%. Would you like to change your response, or is there something else you were considering?

(3) Other _____ *[Be sure these sum to 100%]*

9. Are there any ways that you and your household impact the water quality of Galveston Bay?

- (1) Yes
(2) No *[Go to question 10]*

If yes, How? [Do not prompt]

- (1) Municipal wastewater discharge
(2) Runoff of fertilizers and pesticides
(3) Auto discharges finding their way into the Bay
(4) Other _____

[Also, if yes,] Do you feel that the impact that your household makes on the water quality of Galveston Bay is more than, less than, or about the same as other households in the Greater Houston-Galveston area?

- (1) More than other households
(2) Less than other households
(3) About the same as other households

10. Which of the following best reflects your thinking? *[Enumerator: Give respondent Handout #2]*

- (1) I feel that there should be a management plan for Galveston Bay, and I feel some responsibility for paying for it.
- (2) I feel that there should be a management plan for Galveston Bay but I do not really feel that it is my responsibility to pay for it.
- (3) I don't think there should be a management plan for Galveston Bay.
[Go to question 11]

[If the respondent chooses (1) or (2), prompt unless volunteered:]

Who else should be responsible for paying for a management plan for the Bay?

If the respondent chose (1) or (2) ask: On a scale from 1 to 10, how responsible do you feel for providing financial support for the plan?

1	2	3	4	5	6	7	8	9	10
Not very					Very				
responsible					responsible				

Why? _____

11. Now I want you to suppose that your household moved away from the Greater Houston/Galveston area--say you were offered a wonderful job that you decided to accept. Let's assume that this job was in another state and you had to leave Texas.

Would you still vote for the management plan if it cost your household *[max WTP]* per month for five years?

- (1) Yes
- (2) No

12. What is the most you would be willing to pay per month to support the management plan if you no longer lived in Texas? *[Max WTP]* _____

[If respondent indicates any positive amount, go to question 14; if zero amount, go to question 13]

13. Why is this?

(1) It is the responsibility of those who live here.

(2) Other _____

(Go to question 15)

14. Why is this?

(1) I would still come back to visit and use the Bay.

(2) I want the quality of the Bay to be improved even if I never use it.

(3) Other _____

15. What features of the management plan described in the questionnaire do you particularly like? *(Do not prompt, but allow them to review the management plan components in handout #1.)*

(1) Tighter water quality standards

(2) Restrictions on residential and commercial development in sensitive areas

(3) Increased monitoring and enforcement

(4) Prohibition of sewage dumping from boats

(5) Requirements for those responsible for spills to pay for damages

(6) Clean up program for trash and marine debris

(7) Creation of new wetland reserves and replanting of seagrass beds

(8) "Rapid response" capability to clean up spills (including new equipment)

(9) Test all types of seafood regularly

(10) Public programs to reduce discharge of waste oil , fertilizers, etc. into Bay

(11) Other _____

16. What features of the plan do you not like or do you think are not important? *(Do not prompt, same as 15)*

(1) Tighter water quality standards

(2) Restrictions on residential and commercial development in sensitive areas

(3) Increased monitoring and enforcement

(4) Prohibition of sewage dumping from boats

(5) Requirements for those responsible for spills to pay for damages

(6) Clean up program for trash and marine debris

(7) Creation of new wetland reserves and replanting of seagrass beds

(8) "Rapid response" capability to clean up spills (including new equipment)

(9) Test all types of seafood regularly

(10) Public programs to reduce discharge of waste oil , fertilizers, etc. into Bay

(11) Other _____

-

- (1) Yes
(2) No

-
- A horizontal number line with tick marks at every integer from 1 to 10. The numbers 1 through 10 are written below the corresponding tick marks.

Very likely

- (1) Vote FOR
- (2) Vote AGAINST
- (3) No opinion
- (4) Don't know

-

(1) Yes
(2) No
(3) Don't know *[Go to question 24]*

23. *[If Yes or No] Why is this?*

[Enumerator: Check to see if this respondent received a video. If not, skip to question 29]

24. Did you have a chance to watch the video we sent you?

- (1) YES
- (2) NO

If yes, when did you watch it? _____ *[Day of week; date if known]*

[25. Enumerator: how many days ago was that? Number of days _____]

26. Could you describe your impressions of the video? *[Record exact response]*

27. Do you think the video presented issues fairly?

- (1) YES
- (2) NO

28. Do you think your answer regarding how much you would be willing to pay to support the management plan would have been different if you had not seen the video?

- (1) YES
- (2) NO

[If YES, ask why, and record full response]

29. Did you discuss the questionnaire you received in the mail with other members of your household or with your neighbors or friends?

- (1) YES
- (2) NO

30. Can you tell me about how far it is from your house to *Northwest Mall/Mall of the Mainland/Baytown Community Center*?

_____ driving time (one way)
_____ miles

31. What is your zip code? _____

[Enumerator: Use Q32a. only for Northwest Mall and Mall of the Mainland, for Baytown Community Center site answer question 32b.]

- 32a. Did you make a special trip to come to the Mall to return the questionnaire, or would you probably have been coming to *Northwest Mall/Mall of the Mainland* anyway?

- (1) special trip
(2) would have come any way

[go to question 34]

- 32b. Did you make a special trip to come to the Baytown Community Center or were you coming by this way anyway?

- (1) special trip
(2) would have been coming this way anyway

Now I would like to ask you about your impressions of the questionnaire.

33. When you read the questionnaire, did it seem biased to you in any way? *[Record exact response].*

- (1) Yes
(2) No
-
-

This ends the first part of the interview. In order to know which parts of the written interview I need to give you, I need to ask you a few questions about recreational activities you may have participated in in the past 12 months.

34. In the last 12 months, have you used Galveston Bay for **recreational boating**? This does not include any days you were **fishing** from a boat.

- (1) YES *[Go to question 35]*
(2) NO *[Go to question 37]*
(3) I don't remember.

I am going to ask separately about motorized and non-motorized boating.

35. How many days did you go canoeing, sailing, or other **non-motorized boating** on the Bay in the past 12 months? *[Enumerator: a sailboat with a motor counts as a non-motorized boat]*

(1) _____ days
(2) I don't remember.

36. How many days did you go **motorboating** (including waterskiing) on the Bay in the past 12 months?

(1) _____ days
(2) I don't remember.

37. In the past 12 months, have you **fished** in Galveston Bay, either from the shore or from a boat? *[Enumerator: fishing from shore includes fishing from a pier or a dock.]*

(1) Yes *[Enumerator: Stop here and GIVE FISHING PACKET A.]*
(2) No

38. In the past 12 months, have you fished any place other than Galveston Bay, either from the shore or from a boat?

(1) Yes *[Enumerator: Give FISHING PACKET B to respondent, along with HOUSEHOLD PROFILE PACKET.]*
(2) No *[Enumerator: Give HOUSEHOLD PROFILE PACKET ONLY to respondent.]*

Please take a few moments to fill out this final section of the questionnaire. While you are filling this out, I'm going check over your answers to the questionnaire so that I'm sure that I understand them. *[Enumerator: Be sure all questions in the mail questionnaire are answered. When respondent is finished with the written follow-up, make sure all questions are complete and then clarify anything that is missing or unclear from the questionnaire.]*

That's the end of our follow-up interview. Thank you so much for taking the time to talk to us. I need to get your check now. I would appreciate it if you would just sign this receipt for our records to indicate that you received it.

For Enumerator Only:

61. *Was the person who answered the questions irritated or nervous during the interview?*

YES/NO

62. *Do you think the respondent made an effort to tell the truth about the willingness-to-pay questions?*

YES/NO

63. *How would you rate the overall quality of the interview?*

GOOD/FAIR/POOR

Blank

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**Mail/In-person Follow-up Survey:
Follow-up Questionnaire
Part II.**
(Completed in Writing by Respondent)

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200

FISHING QUESTIONS: A

The questions below ask you separately about your fishing in Galveston Bay and in other places. Please remember that **Galveston Bay** does not include the Gulf of Mexico or the freshwater lakes and rivers in the area. If any questions aren't clear, please feel welcome to ask the interviewer for assistance.

A39. a. In the last 12 months, when you used **Galveston Bay** for recreational **fishing**, did you fish from a boat, a pier, or along the shore? *[Circle those that apply and fill in the blanks where appropriate.]*

(1) I fished from a **boat** ____ days in the last 12 months.

On a typical day, how many fish did you usually catch? _____

(2) I fished from a **pier or along the shore** ____ days in the last 12 months.

On a typical day, how many fish did you usually catch? _____

(3) I don't remember.

b. Please indicate, by writing an "F" on the attached map, the approximate location on Galveston Bay where you went to fish the most often. If you went by boat, also indicate the place where you rented, launched, or docked your boat, with the letter "B".

c. Do you ever eat the fish that you catch here? *(Please circle one)*

(1) Yes, at least sometimes

(2) No, never

d. On average, how many members of **your household** (including yourself) went on a typical fishing trip to Galveston Bay? _____

e. On average, how many hours do you usually spend fishing on a typical trip to Galveston Bay? _____ (hours)

f. About how much money does **your household** spend in one day on entrance and/of boat launching fees (if any) and other costs to fish in Galveston Bay?

(1) boat or equipment rentals: _____ dollars per day

(2) supplies (i.e., bait, boat fuel, etc.): _____ dollars per day

(3) parking, entrance and launch fees: _____ dollars per day

(4) other (please specify) _____: _____ dollars per day

FISHING QUESTIONS A, page 2

- g. How far did you usually travel from your home to this place? (If you used a boat, please write down the distance from your home to the place where you rented, launched, or docked the boat.)

- (1) _____ miles
(2) _____ driving time

- A40. a. In the last 12 months, have you gone someplace **other than Galveston Bay** for recreational fishing, either from a boat, a pier, or along the shore? *[Please circle all those that apply and fill in the blanks where appropriate.]*

- (1) Yes, I have gone fishing from a **boat** some place other than Galveston Bay in the last 12 months.

How many days in the last 12 months did you go fishing from a boat some place other than Galveston Bay? _____

On a typical day, how many fish did you usually catch? _____

- (2) Yes, I have gone fishing from a **pier or along the shore** some place other than Galveston Bay in the last 12 months.

How many days in the last 12 months did you go fishing from a **pier or along the shore** some place other than Galveston Bay? _____

On a typical day, how many fish did you usually catch? _____

- (3) No.

- (4) I don't remember.

- b. Please indicate, by writing an "F" on the attached map, the approximate location **other than Galveston Bay** where you went to fish the most often. If you went by boat, please also indicate the place where you rented, launched, or docked your boat, with the letter "B". If the place you went is not on the map, please write the name of the place here. _____

- c. Do you ever eat the fish that you catch here?

- (1) Yes, at least sometimes
(2) No, never

FISHING QUESTIONS: B

The questions below ask about your fishing activities at places **other than Galveston Bay**. If you fish in the Gulf of Mexico, the freshwater lakes and rivers in the area, or any place outside the Houston-Galveston area (even if you launch your boat from within Galveston Bay), this is what we'd like you to tell us about. If any questions aren't clear, please ask the interviewer for assistance.

- B39. a. In the last 12 months, when you have gone some place **other than Galveston Bay** for recreational fishing, did you fish from a boat, a pier, or along the shore? *(Please circle those that apply and fill in the blanks where appropriate.)*
- (1) I fished from a **boat** ____ days in the last 12 months.
- On a typical day, how many fish did you usually catch? _____
- (2) I fished from a **pier or along the shore** ____ days in the last 12 months.
- On a typical day, how many fish did you usually catch? _____
- (3) I don't remember.
- b. Please indicate, with an "F" on the attached map, the approximate location where you went to fish the most often. If you went by boat, please also indicate the place where you rented, launched, or docked your boat, with the letter "B". If the place you went is not on the map, please write the name of the place here. _____
- c. Do you ever eat the fish that you catch here?
- (1) Yes, at least sometimes
- (2) No, never
- d. On average, how many members of **your household** (including yourself) went on a typical fishing trip to this place? _____
- e. On average, how many hours do you usually spend fishing on a typical day in this place? _____ (hours)

f. About how much money does **your household** spend in one day on entrance and/or boat launching fees (if any) and other costs to engage in this activity?

- (1) boat or equipment rentals: _____ dollars per day
- (2) supplies (i.e., bait, boat fuel, etc.): _____ dollars per day
- (3) parking, entrance and launch fees: _____ dollars per day
- (4) other (please specify) _____: _____ dollars per day

g. How far did you usually travel from your home to this place? (If you used a boat, please write down the distance from your home to the place where you rented, launched, or docked the boat.)

- (1) _____ miles
- (2) _____ driving time

PERSONAL AND HOUSEHOLD PROFILE

The following questions ask about you and your household. Please remember that this information will be kept confidential. Your responses to these questions will help us understand how others like you might have responded to the questions in our questionnaire.

41. How old are you? _____
42. What is your gender?
- (1) Female (2) Male
43. How many years of education have you completed?
- (1) No school
(2) Grade school (1-8)
(3) Some high school (9-11)
(4) High school diploma (12)
(5) Some college (13-15)
(6) College degree (16)
(7) Post graduate (17+)
44. Including yourself, how many people are in your household? _____
45. How many people under 18 live in your household? _____
46. How long have you lived in the Greater Houston-Galveston Area?
- (1) Less than 5 years
(2) 5 to 10 years
(3) 11 to 20 years
(4) Longer than 20 years, or born here
47. What is your employment status?
- (1) Employed full-time
(2) Employed part-time
(3) Employed part-time, but seeking a full-time work
(4) Unemployed and seeking work
(5) Student
(6) Full-time homemaker
(7) Retired
(8) Not seeking work at the present time

48. What is your occupation (job)? _____
49. Do you own a house?
- (1) Yes. What do you estimate is its market value? _____
- (2) No. What is the amount you pay each month in rent? _____
49. Does any one in your **household** own a boat? *(Please circle all that apply)*
- (1) Yes, a non-motorized boat (i.e. row boat, canoe, kayak, sailboat, etc.)
- (2) Yes, a motorized boat
- (3) No
50. Does anyone in your **household** have a fishing or combined hunting/fishing license?
(Please circle one)
- (1) Yes
- (2) No
51. Do you consider yourself to be an active environmentalist, sympathetic to environmental causes, or unsympathetic to environmental causes? *(Please circle one)*
- (1) Active
- (2) Sympathetic
- (3) Unsympathetic
- (4) I don't know/I'm not sure.
52. Do you belong to any environmental organizations?
- (1) Yes
- (2) No
53. Do you donate money to any non-profit organizations, other than religious groups?
- (1) Yes
- (2) No
- (3) Prefer not to answer

54. About how much did you donate to non-profit organizations (**not** including religious groups) in the past year?

- (1) \$1-49
- (2) \$50-99
- (3) \$100-299
- (4) \$300-499
- (5) \$500-999
- (6) More than \$1000
- (7) Prefer not to answer
- (8) None

55. What was your total **household** income last year from all sources (before taxes)?

- (1) less than \$10,000
- (2) \$10,000 to \$19,999
- (3) \$20,000 to \$29,999
- (4) \$30,000 to \$39,999
- (5) \$40,000 to \$49,999
- (6) \$50,000 to \$59,999
- (7) \$60,000 to \$69,999
- (8) \$70,000 to \$79,999
- (9) \$80,000 to \$89,999
- (10) \$100,000 and over

56. What is your racial or ethnic group?

- (1) Asian/Asian American
- (2) Black/African American
- (3) Hispanic
- (4) Interracial
- (5) Native American/American Indian
- (6) White
- (7) Other_____

The following questions ask about your personal attitudes towards some controversial issues. Your responses to these questions will help us to determine if the opinions of our respondents are similar to those of other people living in the Greater Houston-Galveston area. Please read the questions and circle the response that best represents your opinion on these issues.

57. Would you agree or disagree with the following statement: "The federal government is likely to do more harm than good if it tries to create new jobs and strengthen the economy."?

- (1) Agree
- (2) Disagree
- (3) I don't know.
- (4) I prefer not to answer.

58. Which of the following statements is closest to your own views on abortion?

- (1) Abortion should be illegal in the United States.
- (2) A woman should have the right to choose whether or not to have an abortion.
- (3) I don't know.
- (4) I prefer not to answer.

59. I support capital punishment for persons convicted of first degree murder.

- (1) Agree
- (2) Disagree
- (3) I don't know.
- (4) I prefer not to answer.

60. I support gun control laws that restrict access to semi-automatic weapons.

- (1) Agree
- (2) Disagree
- (3) I don't know.
- (4) I prefer not to answer.

**Handouts Shown to Respondents
During Follow-Up Interview
Mail/In-Person Follow-Up Survey**

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Handout #1: Description of a Possible Management Plan for Galveston Bay:

Assume the management plan included the following regulatory actions which would:

- tighten water quality standards for municipal and industrial wastewater discharges, and prohibit discharges of wastewater from oil wells into the Bay;
- restrict further residential and commercial development in environmentally sensitive areas;
- increase monitoring and enforcement activities, including efforts to prevent illegal dumping into storm sewers;
- prohibit dumping of sewage from recreational and commercial boats into the Bay; and
- require those responsible for oil and chemical spills in Galveston Bay to pay for the damages these spills cause.

In addition, suppose that the management plan included several **new programs** to improve environmental quality in the Bay. These efforts would:

- initiate a cleanup program to remove trash and marine debris along the Galveston Bay shoreline;
- create new "wetland reserves" in existing wetland areas and replant damaged seagrass beds to provide habitat and breeding areas for many species of birds and fish;
- purchase more equipment to control and clean up oil and chemical spills in Galveston Bay and establish a "rapid response" capability to minimize the effects of these spills;
- establish a program to test all types of seafood regularly and to warn the public of possible contamination of seafood from the Bay; and
- establish recycling and public education programs to reduce discharges of waste oil, fertilizer, pesticides, and other hazardous substances from households and businesses that now find their way into Galveston Bay.

This management plan would not affect the amount of shipping activity through Galveston Bay. Assume that shipping would be allowed to grow, whether or not the Houston Ship Channel is deepened and widened, as long as environmental standards on oil and waste discharges were strictly observed. In other words, this management plan would not restrict commercial shipping

activity through the Houston Ship Channel, nor would it prevent the deepening and widening of the channel.

Handout #2:

- (1) I feel that there should be a management plan for Galveston Bay, and I feel some responsibility for paying for it.
- (2) I feel that there should be a management plan for Galveston Bay but I do not really feel that it is my responsibility to pay for it.
- (3) I don't think there should be a management plan for Galveston Bay.

**Mail-Only Survey:
Contents of Mailed Package**

a. Introductory Letter

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214



THE UNIVERSITY OF NORTH CAROLINA
AT
CHAPEL HILL

Mr. 6~7~ 8~
9~
10~11~ 3~

May 11, 1993

Dear Mr. 8~,

Your household is one of a small number of households in the Greater Houston-Galveston area that has been selected at random to take part in a study concerning the future of Galveston Bay. This work is being conducted by The University of North Carolina, in conjunction with the Galveston Bay National Estuary Program in Webster, Texas, the Texas Water Commission, and the United States Environmental Protection Agency.

The purpose of our research is to collect information regarding the economic, social and environmental importance of Galveston Bay, using questionnaires such as the one enclosed with this letter. Citizens' groups and policy makers in your area will use this information to develop a comprehensive management plan for the Bay. In order for our results to accurately reflect the opinions of the people in the Houston-Galveston area, it is important that each questionnaire be completed and returned. **Even if you have no direct use of Galveston Bay, or if you have no opinion regarding some of the issues discussed in the attached materials, we still need your participation.**

Please understand that we are **not** selling anything, and all we are asking of you are your opinions. Participation in the study is voluntary and there is no penalty for not participating or for withdrawing from the study.

In completing the questionnaire, if there is a question which you do not understand or do not wish to answer, please skip over it. There are no right or wrong answers; we simply want your honest opinions. After you have completed the questionnaire, please mail it back to us in the enclosed, stamped envelope. Your responses to the questions will be kept completely confidential. Your name will never be recorded anywhere on the questionnaire.

I would be happy to answer any questions you may have about the survey or this research project. Please call collect at (919) 966-7912; if I am not in, please leave a message with my

administrative assistant, Stephanie Marfino, and I will return your call. If you would like a summary of the results of this study, fill out your name and address on the enclosed postcard and return it to us. Please do not put your name or address on the questionnaire itself.

Thank you in advance for your cooperation. We look forward to receiving your questionnaire in the near future.

Sincerely,

Dale Whittington
Professor and Co-principal Investigator

**Mail-Only Survey:
Contents of Mailed Package**

b. Mail-Only Questionnaire

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GALVESTON BAY STUDY

(Please note: This questionnaire may be completed by **any adult member** of your household.)

To the respondent: Please read and complete the entire questionnaire. You should answer each question based on your *own* experience and opinion, unless you are specifically asked for *household* information.

SECTION 1: SOCIAL, ECONOMIC, AND ENVIRONMENTAL ISSUES

1. In your opinion, which **two** of the problems in the box below are the most important for state and local governments of Texas to solve in the Greater Houston-Galveston area? Please write a **"1"** next to the **most important**, and a **"2"** next to the **second most important**.

a. <input type="checkbox"/>	Unemployment
b. <input type="checkbox"/>	Poor economic performance
c. <input type="checkbox"/>	The AIDS epidemic
d. <input type="checkbox"/>	Crime
e. <input type="checkbox"/>	The quality of the public schools
f. <input type="checkbox"/>	Pollution
g. <input type="checkbox"/>	Traffic congestion in and around cities
h. <input type="checkbox"/>	Other (please specify) _____
i. <input type="checkbox"/> Not sure/No opinion	

2. Suppose your local government were given federal money to help solve some environmental problems in Galveston Bay over the next couple of years. Which of the problems in the box below would you hope the government worked on first and second? Please write a "1" next to the **first** problem which you hope they would solve, and a "2" next to the **second**.

a. <input type="checkbox"/> Runoff from agricultural pesticides and fertilizers
b. <input type="checkbox"/> Discharge of wastewater from cities around the Bay
c. <input type="checkbox"/> Discharge of refinery and other industrial waste into the Bay
d. <input type="checkbox"/> Seepage from landfills
e. <input type="checkbox"/> Storm water runoff from roads and highways around the Bay
f. <input type="checkbox"/> Oil and chemical spills from shipping in the Bay
g. <input type="checkbox"/> Beach litter and other debris which has washed ashore
h. <input type="checkbox"/> Other (please specify) _____
i. <input type="checkbox"/> Not sure/No opinion

3. In your opinion, has the overall environmental condition of Galveston Bay been getting better, getting worse, or staying the same in the last five years? *(Please circle one)*

- (1) Getting better
- (2) Getting worse
- (3) Staying the same
- (4) I don't know

4. About how often have you seen, heard, or read about pollution in Galveston Bay from TV, radio, newspapers, or magazines in the last year? *(Please circle one)*

- (1) Never
- (2) A few times (1 to 4)
- (3) Several times (5 to 10)
- (4) Many times (11 to 20)
- (5) More than 20 times
- (6) I don't know

5. Do you feel that reducing water pollution in Galveston Bay is important?

(1) No. I don't feel that reducing water pollution in the Bay is important.

If no, please circle the letter below that most closely reflects your thinking.

(a) I don't think that pollution of the bay is a problem.

(b) I think that there are other problems that should be addressed first. (*please specify*): _____

(c) For other reasons (*please specify*): _____

(d) I don't know.

(2) Yes. I do feel that reducing water pollution in Galveston Bay is important.

If yes, please circle the letter below that most closely reflects your thinking.

(a) I want to use the Bay for recreation purposes.

(b) I want others to be able to use the Bay for recreation purposes.

(c) I want to prevent further harm to mammals, birds, fish and other wildlife.

(d) I want to protect human health.

(e) I want to protect the entire Bay environment for future generations.

(f) For other reasons (*please specify*): _____

(g) I don't know.

6. Are there any ways that you and your household impact the water quality of Galveston Bay?

(1) Yes

(2) No (go to question 7)

If yes, How? _____

Also, if yes, Do you feel that the impact that your household makes on the water quality of Galveston Bay is more than, less than, or about the same as other households in the Greater Houston-Galveston area?

(1) More than other households

(2) Less than other households

(3) About the same as other households

7. Which of the following statements most closely reflects your opinion? (*Please circle one*)

(1) Creating and protecting jobs are more important than preserving the environment.

(2) Protection of the environment should not be sacrificed to save jobs.

(3) I am not sure.

(4) I don't have an opinion on this subject.

8. There is currently a proposal to deepen and widen the Houston Ship Channel including the part of it that runs through Galveston Bay. Which of the following statements best reflects your knowledge of this issue? *(Please circle one)*

- (1) I am not aware of this proposal.
- (2) I have heard about it but don't know the details of the proposal.
- (3) I know a good deal about it.

SECTION 2: YOUR USE OF GALVESTON BAY

Please note: "Galveston Bay" refers to the Bay system that includes Trinity, East, West, and Christmas Bays, as well as the many minor Bays and Bayous that feed into it, including Clear Lake. These questions do NOT include the Gulf of Mexico or other nearby water bodies (i.e., these questions do not concern the ocean side beaches on Galveston Island or freshwater lakes). Also, in questions 10-15 below, a day refers to a full day or any part of a day spent doing the activity.

9. How far is it from your home to the closest part of the Bay? *(Please circle and fill in blank if appropriate)*

- (1) _____ miles
- (2) _____ driving time
- (3) I live next to the Bay.

10. In the last 12 months, did you **go to a beach** on Galveston Bay? *(Please circle one)*

- (1) Yes
- (2) No
- (3) I don't remember.

If yes, about how many days did you go to a Galveston Bay beach in the last 12 months?

11. In the last 12 months, did you go **hiking, picnicking, camping, and/or birdwatching** along the shore of Galveston Bay? *(Please circle one)*

- (1) Yes
- (2) No
- (3) I don't remember.

If yes, about how many days did you spend on these activities in the last 12 months?

12. In the last 12 months, did you go **hunting or trapping** on or along the Galveston Bay shore? *(Please circle one)*

- (1) Yes
- (2) No
- (3) I don't remember.

If yes, about how many days did you go hunting or trapping on or along the Galveston Bay shore in the last 12 months? _____

13. In the last 12 months, to your knowledge did you **eat seafood** that was caught in Galveston Bay? *(Please circle one)*

(1) Yes (2) No (3) I don't remember.

If yes, about how many times **per month** do you eat seafood from Galveston Bay? _____

14. In the last 12 months, did you use Galveston Bay for recreational **fishing**, either from a boat, a pier, a jetty, or along the shore? *(Please circle one)*

1) Yes (2) No (3) I don't remember.

If yes, about how many days did you use Galveston Bay for recreational fishing in the last 12 months? _____

15. In the last 12 months, have you used Galveston Bay for recreational **boating**? This includes canoeing, kayaking, motorboating, sailing, windsurfing, jetskiing and waterskiing. Please **do not** include any days that you were **fishing** from a boat.

(1) Yes (2) No (3) I don't remember

If yes, about how many days did you use Galveston Bay for recreational boating in the last 12 months? _____

SECTION 3: GALVESTON BAY

OVERVIEW: GALVESTON BAY TODAY

Galveston Bay is made up of many smaller bays and bayous, including Trinity Bay, West Bay, East Bay and Clear Lake. Fresh water from rivers and streams flows into the Bay and combines with salt water from the Gulf of Mexico to form an area in which many fish, shellfish, and coastal birds live and breed. Some features that make the Bay such a productive area for fishing and shellfishing are its wetlands, areas of underwater grasses, and oyster reefs. Galveston Bay produces more oysters than any other estuary on the Texas coast; in good years, the Bay yields as much as 70% of the oyster production in Texas and 30% of all oysters harvested in the United States.

Galveston Bay is also home to the Port of Houston, the third largest port in the country. The Houston Ship Channel, which passes through the Bay between Houston and Galveston, is an important transportation link between Texas and the rest of the world. Nearly one third of the nation's petroleum production and half of its chemical production are transported through this channel. The port and ship channel contribute to employment and income of the region.

The Bay also provides recreational and educational opportunities for many people. Fishing, boating, swimming, camping, birdwatching, hunting, and hiking along the shoreline are ways in which many people enjoy using the Bay. Wildlife preserves, such as those at Armand Bayou and Christmas Bay, are important educational areas for school children and researchers alike.

HOW IS GALVESTON BAY CHANGING?

Over the past 50 years, the Bay has undergone many changes. Industrial development has created jobs in the region, which has stimulated population growth and increased the need for new housing and recreational opportunities. The population of the greater Houston-Galveston area is now approximately 3.3 million, and is expected to grow to 4 million by the year 2000. This growth will put additional demands on the resources of the Bay.

The economic growth and population increases have affected the Bay in a variety of ways. In the mid-1960s the water quality in the Bay was extremely poor, mostly due to inadequate treatment of wastewater from cities and industries. In the 1970s, laws were passed to improve water quality. These have helped reduce the amounts of some pollutants, so now the Bay is much cleaner than it has been for a long time. However, half of the Bay is still closed to shellfishing due to public health concerns, and the number of oil and chemical spills in the Bay has increased.

Economic and population growth in the Bay area have also had effects on wildlife habitat and natural areas, such as the loss of coastal wetlands. Pumping of groundwater, oil, and gas around the Bay leads to land subsidence (sinking), which destroys wetlands. In addition, development near the shore (of roads, houses, factories, etc.) often results in the loss of wetlands. Lastly, waves from ships passing through the Bay beat steadily on the edges of wetland areas, breaking them down. An example of what can happen because of these pressures is the situation on Galveston Island, where 37% of the wetlands have been lost. Seagrass areas in the Bay, which are important for fish spawning, have also been damaged. Waves from ships and motorized boats stir up sand and mud, clouding the water and blocking out sunlight needed by seagrasses. Ninety five percent of the Bay's seagrass areas have been destroyed since 1979.

MANAGING THE MANY USES OF THE BAY

Finding a balance between the protection of public health, the preservation of natural areas for future generations, and the industrial, shipping, and recreational uses of the Bay, requires thought and planning. The adoption of a management plan for Galveston Bay may help address these conflicting uses.

Likely situation if no management plan is implemented:

If no management plan for Galveston Bay is implemented, it is likely that more wetland areas and other habitats will be lost. If current trends continue, 10% of the remaining wetlands in the Bay (about 30 square miles) will be lost in the next 20 years, and about half of the wetlands will be lost

by the year 2100. Without a management plan the water quality of Galveston Bay would probably not change much. Currently, half of the Bay is open for shellfishing and it is likely that this will continue if no management plan is adopted. It would probably remain safe to eat the currently suggested limit of about 4 ounces (1 serving) of shellfish per person from the Bay every week. The number of oil and chemical spills requiring Coast Guard assistance is now about 1 every day, and is likely to remain at this level if a management plan is not implemented.

Description of a Possible Management Plan for Galveston Bay

Suppose a management plan were proposed for Galveston Bay that tried to balance the needs of current users of the Bay, such as commercial fishermen, industries, and citizens, with the goals of improved water quality and wildlife habitat protection.

Assume the management plan included the following **regulatory actions** which would:

- tighten water quality standards for municipal and industrial wastewater discharges, and prohibit discharges of wastewater from oil wells into the Bay;
- restrict further residential and commercial development in environmentally sensitive areas;
- increase monitoring and enforcement activities, including efforts to prevent illegal dumping into storm sewers;
- prohibit dumping of sewage from recreational and commercial boats into the Bay; and
- require those responsible for oil and chemical spills in Galveston Bay to pay for the damages these spills cause.

In addition, suppose that the management plan included several **new programs** to improve environmental quality in the Bay. These efforts would:

- initiate a cleanup program to remove trash and marine debris along the Galveston Bay shoreline;
- create new "wetlands reserves" in existing wetland areas and replant damaged seagrass beds to provide habitat and breeding areas for many species of birds and fish;
- purchase more equipment to control and clean up oil and chemical spills in Galveston

Bay and establish a "rapid response" capability to minimize the effects of these spills;

- establish a program to test all types of seafood regularly and to warn the public of possible contamination of seafood from the Bay; and
- establish recycling and public education programs to reduce discharges of waste oil, fertilizer, pesticides, and other hazardous substances from households and businesses that now find their way into Galveston Bay.

This management plan would not affect the amount of shipping activity through Galveston Bay. Assume that shipping would be allowed to grow, whether or not the Houston Ship Channel is deepened and widened, as long as environmental standards on oil and waste discharges were strictly observed. In other words, this management plan would not restrict commercial shipping activity through the Houston Ship Channel, nor would it prevent the deepening and widening of the channel.

The citizens of the greater Houston-Galveston area would obviously like to know **how much** the quality of the Bay would improve as a result of this management plan, as well as what impacts the plan might have on the region's economy. The economy and ecosystem of Galveston Bay are too complex, however, to predict precisely the effects such a plan would have.

If the management plan were adopted, we know that water quality in the Bay would be improved. The Bay would also be **safer** because less toxic material (such as heavy metals and pesticides) would be discharged into its waters. Experts also estimate that 50% more oyster beds could be opened for harvest, and it would probably be safe to eat more shellfish than the currently suggested amount of 4 ounces per week. In addition, the management plan would reduce the number of spills in the Bay.

If this plan were adopted, it would cost money. Assume that industries would pay the cost of reducing pollution that comes from their facilities, and that citizens in the Galveston Bay area would also be asked to help finance this plan. Also remember that improvements in the quality of the Bay would not occur overnight, but would require a long-term commitment of financial and other resources.

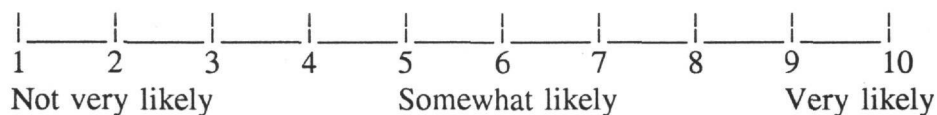
Considering your current income, as well as your expenses for housing, food, utilities, clothing, entertainment, savings, etc., please think about how much you would be willing to pay per month to establish such a management plan for Galveston Bay. Assume that your contribution would be paid by a surcharge on your monthly water bill which would last for five years. (If you do not receive a monthly water bill, the payment would be a surcharge on another monthly utility bill.)

Suppose that government officials estimated that the management plan would cost your household **\$5 per month** for five years (i.e., \$60 per year). This money would only be used to pay for implementing the management plan to clean up and improve Galveston Bay, and would be administered by state and local government agencies. Finally, assume that industries would pay the costs of cleaning up the pollution that comes from their facilities.

16. Given your current monthly income and expenses, if the implementation of the management plan cost your household **\$5 per month** for five years, would you vote for the management plan or against it? *(Please circle one)*

- (1) I would vote for the management plan.
- (2) I would vote against the management plan.
- (3) I'm not sure.

17. On a scale of 1 to 10, how likely do you think it is that the management plan described in the questionnaire would actually result in improved environmental quality?

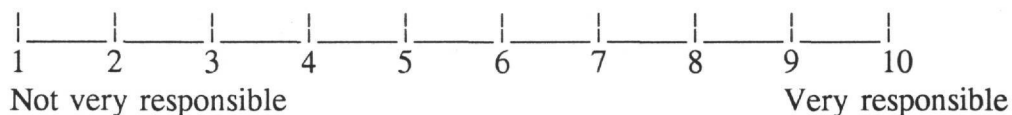


18. a. Which of the following best reflects your thinking?

- (1) I feel that there should be a management plan for Galveston Bay, and I feel some responsibility for paying for it.
- (2) I feel that there should be a management plan for Galveston Bay but I do not really feel that it is my responsibility to pay for it.
- (3) I don't think there should be a management plan for Galveston Bay. *[Go to question 19]*

b. If a management plan is approved for the Bay, who should be responsible for paying for it?

c. On a scale from 1 to 10, how responsible do you feel for providing financial support for the plan?



d. Why? _____

19. If the Houston ship channel were deepened and widened, more large tankers and cargo ships could pass through the Bay, encouraging the economic growth of oil and cargo transport industries. With increased ship traffic, there would also be a greater chance of large spills, and unprotected coastal wetland and seagrass areas would be increasingly damaged. Given these prospects for encouraging economic growth and possible environmental consequences, which of the following statements best reflects your opinion on this issue? *(Please circle one)*

- (1) I want the channel to be deepened and widened.
- (2) I do not want the channel to be deepened and widened.
- (3) I do not have an opinion on this issue.
- (4) I don't know.

SECTION 4: YOU AND YOUR HOUSEHOLD

20. How old are you? _____

21. What is your gender? *(Please circle one)*

- (1) Female
- (2) Male

22. What level of education have you completed? *(Please circle one)*

- (1) No school
- (2) Grade school (1-8)
- (3) Some high school (9-11)
- (4) High school diploma (12)
- (5) Some college (13-15)
- (6) College degree (16)
- (7) Post graduate (17+)

23. Including yourself, how many people are in your household? _____

24. How many people under the age of 18 live in your household? _____

25. How long have you lived in the Greater Houston-Galveston Area? *(Please circle one)*

- (1) Less than 5 years
- (2) 5 to 10 years
- (3) 11 to 20 years
- (4) Longer than 20 years
- (5) My primary residence is outside of the Greater Houston-Galveston area.

26. What is your employment status? *(Please circle one)*

- (1) Employed full-time
- (2) Employed part-time
- (3) Employed part-time, but seeking full-time work
- (4) Unemployed and seeking work
- (5) Student
- (6) Full-time homemaker
- (7) Retired
- (8) I am not employed and am not seeking work at the present time.

27. What is your occupation (job)? _____

28. Do you own a house? *(Please circle one and fill in blank)*

- (1) **Yes.** What do you estimate is its market value? _____
- (2) **No.** What is the amount you pay each month in rent? _____

29. Does anyone in **your household** own a boat? *(Please circle all that apply)*

- (1) Yes, a non-motorized boat (i.e. row boat, canoe, kayak, sailboat, etc.)
- (2) Yes, a motorized boat
- (3) No

30. Does anyone in **your household** have a fishing or combined hunting/fishing license?
(Please circle one)

- (1) Yes
- (2) No

31. Do you donate money to any non-profit organizations, other than to religious groups?
(Please circle one)

- (1) Yes
- (2) No
- (3) I prefer not to answer.

32. Do you consider yourself to be an active environmentalist, sympathetic to environmental causes, or unsympathetic to environmental causes? *(Please circle one)*

- (1) Active
- (2) Sympathetic
- (3) Unsympathetic
- (4) Don't know/Not sure

33. Do you belong to any environmental organizations?

- (1) Yes
- (2) No

34. About how much did you donate to non-profit organizations (**not** including religious groups) in the last year? *(Please circle one)*

- (1) \$1-49
- (2) \$50-99
- (3) \$100-299
- (4) \$300-499
- (5) \$500-999
- (6) More than \$1000
- (7) I prefer not to answer.
- (8) None

35. Below are some income categories for **household** income from all sources before taxes in the last year. Please circle yours.

- (1) Less than \$10,000
- (2) \$10,000 to \$19,999
- (3) \$20,000 to \$29,999
- (4) \$30,000 to \$39,999
- (5) \$40,000 to \$49,999
- (6) \$50,000 to \$59,999
- (7) \$60,000 to \$69,999
- (8) \$70,000 to \$79,999
- (9) \$80,000 to \$89,999
- (10) \$90,000 to \$99,999
- (11) \$100,000 and over

36. What is your racial or ethnic group? *(Please circle one)*

- (1) Asian/Asian American
- (2) Black/African American
- (3) Hispanic/Mexican American
- (4) Interracial
- (5) Native American/American Indian
- (6) White
- (7) Other_____

SECTION 5: THE SURVEY MATERIALS

37. Did you discuss this questionnaire with other members of your household, your friends or relatives?

- (1) Yes
- (2) No

38. Please use the space below for any comments you have regarding our research or survey materials.

Please note: If you have not been fishing on Galveston Bay in the last 12 months, this is the end of the questionnaire. Please return it to us in the stamped envelope provided. Your contribution to this effort is greatly appreciated!

If you have been fishing on Galveston Bay in the last 12 months, please complete the few questions that follow.

39. a. In the last 12 months, have you used **Galveston Bay** for recreational **fishing**, either from a boat, a pier, or along the shore? Circle those that apply and fill in the blanks where appropriate.

(1) No. (Please **STOP HERE** and return the questionnaire to us in the stamped envelope provided.)

(2) Yes, from a **boat** ____ days in the last 12 months.

On a typical day, how many fish did you usually catch? _____

(3) Yes, from a **pier or along the shore** ____ days in the last 12 months.

On a typical day, how many fish did you usually catch? _____

(4) I don't remember.

b. Please indicate, by writing an "F" on the attached map, the approximate location on Galveston Bay where you went to fish most often. If you went by boat, please also indicate the place where you rented, launched, or docked your boat, with the letter "B".

- c. Do you eat the fish that you catch there?
- (1) No, never.
 - (2) Yes, at least sometimes
- d. On average, how many members of **your household** (including yourself) went on a typical fishing trip to Galveston Bay? _____
- e. On average, how many hours do you usually spend fishing on a typical trip to Galveston Bay? _____ (hours)
- f. About how much money does **your household** spend in one day on entrance fees and/or boat launching (if any) and other costs to fish in Galveston Bay?
- (1) boat or equipment rentals: _____ dollars per day
 - (2) supplies (i.e., bait, boat fuel, etc.): _____ dollars per day
 - (3) parking, entrance and launch fees: _____ dollars per day
 - (4) other (please specify) _____: _____ dollars per day
- g. How far did you usually travel from your home to this place (If you used a boat, the distance from your home to the place where you rented, launched, or docked the boat.)
- (1) _____ miles
 - (2) _____ driving time

This is the end of the questionnaire. Please return it to us in the stamped envelope provided. Your contribution to this effort is greatly appreciated!

**Mail-Only Survey:
Follow-up Correspondence**

a. Postcard

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Dear 1 ~ 3 ~ ,

June 19, 1993

Last week, a questionnaire was sent to you asking about your use of Galveston Bay and support for plans to manage its development. your name was selected at random from the five county area surrounding Galveston Bay.

If you have already completed the questionnaire and returned it to us please accept our sincere thanks. If not, please do so today. Because it has been sent to only a small, but representative, sample of residents of the Greater Houston-Galveston area, it is extremely important that yours also be included if the results are to accurately represent the opinions of the people in your area.

If by some chance you did not receive the questionnaire, or it got misplaced, please call me collect at 919-966-3983 and I will send another one to you today.

Sincerely,

Deborah Amaral
Co-Principal Investigator

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**Mail-Only Survey:
Follow-up Correspondence**

- b. Final Follow-up Letter

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THE UNIVERSITY OF NORTH CAROLINA
AT
CHAPEL HILL

Mr. 6~7~ 8~
9~
10~11~ 3~

June 2, 1993

Dear Mr. 8~,

A member of our team contacted you recently by phone to follow up on the questionnaire about Galveston Bay that we had sent to you in mid-May. You indicated that you no longer had a copy of the questionnaire so we are sending you a replacement for you to complete and return to us.

The purpose of our research is to collect information regarding the economic, social and environmental importance of Galveston Bay. Citizens and policy makers in your area will use this information to develop a comprehensive management plan for the Bay. In order for our results to accurately reflect the opinions of the people in the Houston-Galveston area, it is important that each questionnaire be completed and returned. Even if you have no direct use of Galveston Bay, or if you have no opinion regarding some of the issues discussed in the attached materials, we still need your participation.

In completing the questionnaire, if there is a question which you do not understand or do not wish to answer, please skip over it. There are no right or wrong answers; we simply want your honest opinions. After you have completed the questionnaire, please mail it back to us in the enclosed, stamped envelope. Your responses to the questions will be kept completely confidential. Your name will never be recorded anywhere on the questionnaire. Participation in the study is voluntary, and there is no penalty for not participating or for withdrawing from the study.

We look forward to receiving your completed questionnaire very soon. Thank you for participating!

Sincerely,

Dale Whittington
Professor and Co-principal Investigator

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